

Technology Opportunity

Stereo Imaging Velocimetry (SIV)

The National Aeronautics and Space Administration (NASA) is seeking to transfer the technology for stereo imaging velocimetry. Stereo Imaging Velocimetry is a new, affordable method for obtaining quantitative, 3D flow information from any transparent liquid or gas which can be seeded with tracer particles. Until now, accurate flow information of this kind was very difficult to obtain and often required the use of dedicated laser-based measurement systems. SIV provides an effectively nonintrusive means for measuring 3D fluid velocities at many points and at high frame speeds by using charge-coupled device (CCD) video cameras artificial neural network-based computational.

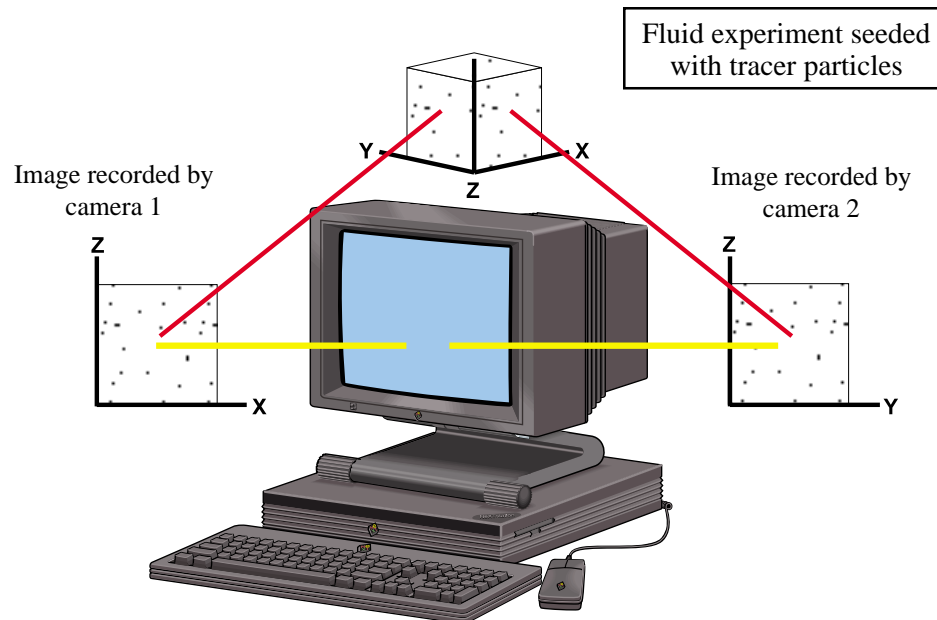
Potential Commercial Uses

- Combustion intake, compression, expansion, exhaust studies.
- Air flow studies around buildings.
- Improved aerodynamics of automobiles and aircraft.

- Avoiding "no flow" regions in artificial hearts.
- Modeling of continuous casting operations (steel, nonferrous alloys).
- Quieter airflow within auto heating and cooling ducts.
- More efficient HVAC.

Benefits

- Three-dimensional
- Uses no lasers
- Safe and affordable
- Utilizes "off-the-shelf" CCD cameras and PC workstation hardware
- Unique tool for direct comparison of computed and experimentally measured fluid flows
- No limitation on fluid flow scale to be measured (microscope to macroscopic)
- Velocities directly comparable to computational models



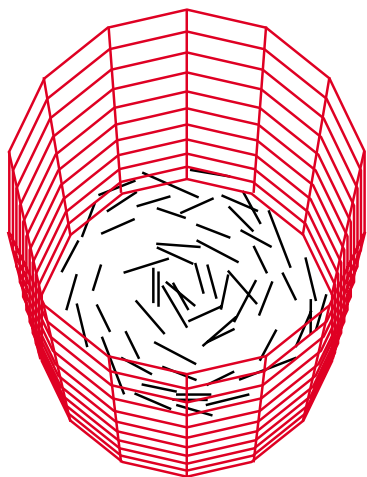
National Aeronautics and
Space Administration
Glenn Research Center



The Technology

High speed, artificial networked-based computational algorithms have been developed which enable up to 500 vectors to be characterized simultaneously. Two CCD camera, placed 90 degree angles, view the same field of moving particles and simultaneously produce 3D, full-field, quantitative measurement of displacements, which are then digitally processed and converted into velocities. No other technique currently exists which can provide depth of information over large volumes for industrial scale applications. As long as sufficient contrast exists—where the cameras can optically distinguish the particles or markers from a transparent carrier fluid—the SIV techniques can be used to particle points over an entire volume at video frame rates (up to 60 frames per second). For high speed flows, camera systems up to 100 frames per second have been adapted for SIV use.

SIV Vectors
NASA GRC



Rotated View of Calculated 3D Vectors

Options for Commercialization

SIV technology was developed by research staff at NASA Glenn Research Center (GRC) in Cleveland, Ohio. NASA GRC is currently seeking companies who want to apply SIV to industrial process optimization and the design of new products. Companies interested in commercializing SIV technology may contact the NASA Glenn Research Center's Commercial Technology Office.

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References

LEW-16457-1, MOA3-16457-1, CF-090-1



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